

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference TJF/JG/JY/41947	FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, item 5 below.</small>	
International application No. PCT/GB2004/002214	International filing date (day/month/year) 24/05/2004	(Earliest) Priority Date (day/month/year) 22/05/2003
Applicant WESTWIND AIR BEARINGS LTD		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☒ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regards to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/002214

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B23B31/20 B23B31/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 06, 22 September 2000 (2000-09-22) -& JP 2000 071115 A (TOYOTA MOTOR CORP), 7 March 2000 (2000-03-07)	1,2,4,8, 28
Y	abstract; figures	5,6
X	US 5 078 558 A (ARAI KUNIO ET AL) 7 January 1992 (1992-01-07) column 5, line 61 - column 6, line 31 figures 5,5E	1,4,8, 11,13, 14,16, 17,19,28
X	US 5 820 136 A (AULTMAN WILLIAM M ET AL) 13 October 1998 (1998-10-13) column 5, line 32 - column 6, line 30 figures 1-5	1,2,4,8
	-/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 September 2004

Date of mailing of the international search report

20. 01. 2005

Name and mailing address of the ISA

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Authorized officer

Breare, D

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2004/002214

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 625 528 A (SAGE IRA H) 7 December 1971 (1971-12-07)	1,4,8
Y	column 1, line 9 - line 16 column 2, line 45 - column 3, line 15 figure 2 -----	2,5
Y	GB 2 002 660 A (HAINBUCH GMBH & CO) 28 February 1979 (1979-02-28) page 1, line 71 - line 79 -----	5,6
Y	GB 1 216 694 A (CATERPILLAR TRACTOR CO) 23 December 1970 (1970-12-23) page 2, line 71 - line 81 -----	2,5
A	DE 36 35 910 A (HERTEL KARL) 4 June 1987 (1987-06-04) figure 1 -----	13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB2004/002214

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2000071115	A	07-03-2000	NONE	
US 5078558	A	07-01-1992	US 5108236 A	28-04-1992
US 5820136	A	13-10-1998	AU 4826297 A WO 9817428 A1	15-05-1998 30-04-1998
US 3625528	A	07-12-1971	NONE	
GB 2002660	A	28-02-1979	DE 2732677 A1 DE 2831140 A1 FR 2397907 A1 US 4214766 A	01-02-1979 24-01-1980 16-02-1979 29-07-1980
GB 1216694	A	23-12-1970	BE 713543 A DE 1752477 A1 FR 1563326 A US 3512792 A	11-10-1968 19-05-1971 11-04-1969 19-05-1970
DE 3635910	A	04-06-1987	DE 8533527 U1 DE 3635910 A1	27-03-1986 04-06-1987

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/002214

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1,2,4-6,8,11,13,14,16,17,19,28

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1,2,4-6,8,11,13,14,16,17,19,28

Tool holder assembly with centrifugal force compensation

2. claims: 3,7,9,10,12,15,18,20-27,29-82

Rotary Tool Holder with friction reducing coating

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/002214

International filing date (day/month/year)
24.05.2004

Priority date (day/month/year)
22.05.2003

International Patent Classification (IPC) or both national classification and IPC
B23B31/20, B23B31/26

Applicant
WESTWIND AIR BEARINGS LTD

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 b/s(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002214

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002214

Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

- 2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
- 3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
- 4. Additional observations, if necessary:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002214

Box No. III Non-establishment of opinion with regard to novelty, inventive step and Industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
- ☒ claims Nos. 3,7,9,10,12,15,18,20-27,29-82

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☒ no international search report has been established for the whole application or for said claims Nos. 3,7,9,10,12,15,18,20-27,29-82
- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
 - the written form ☐ has not been furnished
 - ☐ does not comply with the standard
 - the computer readable form ☐ has not been furnished
 - ☐ does not comply with the standard
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
- ☐ See separate sheet for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/002214

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1,2,4-6,8,11,13,14,16,17,19,28

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	5,6,14
	No: Claims	1,2,4,8,11,13,16,17,19, 28
Inventive step (IS)	Yes: Claims	
	No: Claims	1,2,4-6,8,11,13,14,16,17,19,28
Industrial applicability (IA)	Yes: Claims	1,2,4-6,8,11,13,14,16,17,19,28
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. Since a further search fee in respect of claims 3,7,9,10,12,15,18,20-27 and 27-82 has not been paid, no search report for these claims has been produced and therefore no opinion with regard to novelty, inventive step and industrial applicability can be established.

Re Item IV

Lack of unity of invention

1. This Authority considers that there are 2 inventions covered by the claims indicated as follows:
 - I: Claims 1,2,4-6,8,11,13,14,16,17,19 and 28 directed to a rotary tool holder assembly with centrifugal force compensation.
 - II: Claims 1+3,1+7,1+9,1+10,1+11+12,1+11+14+15,1+16+18 (or 1+11+17+18), 1+19+20, 1+(21-27), and 29-82 directed to a rotary tool holder assembly with friction reducing coating.

Note that claims 2-4, 7-11,16, 21-28 have been considered as being dependent only from claim 1.

2. The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are stated below.
3. The prior art has been identified as document US5078558 and discloses (the references and notes in parentheses referring to this document):

A rotary tool holder assembly (see column 5, line 61 to column 6, line 31 and figures 5 and 5E) for high speed rotation (column 7, lines 17-22, fig 6) comprising a collet (24") and a shaft (101"), the collet being moveable (column 5, lines 43-60) relative to the shaft between a tool gripping position, in which the inserted tool (25) can be gripped for rotation, and a tool release position, the shaft comprising a bore (27a) for receiving the collet (24").

The feature of claim 1 "the shaft and collet shaped such that when the rotary tool holder assembly is rotated at a high speed the inner surface of the shaft bore substantially fits the outer surface of the collet" is standard in the art and therefore disclosed by D1. This is especially true since the term "high speed" has no recognised definition in the art and is therefore to be regarded as a relative term.

The subject matter of claim 1 is therefore not novel.

4. The subject matter of claims 1+4, 1+8, 1+11, 1+11+13, 1+16, 1+11+17, 1+16+19 and 1+28 is disclosed in D1 and therefore the features of these claims cannot be regarded as potential special technical features (PSTFs) within the meaning of Rule 13.2 PCT. The subject matter of claim 1+11+14 constitutes a minor modification of the rotary tool holder assembly of claim 11 which would be obvious for the person skilled in the art.
5. The relevant technical features not disclosed by D1 of claims 1+2 (or 1+4+5) refer to the provision of a good fit between the collet and the shaft bore at high speed. These features can be considered as a potential special technical features (PSTFs) of the first group of claims (invention I) within the meaning of Rule 13.2 PCT. The problem solved by the PSTFs of the first group of claims (invention I) can be construed as providing a rotary tool holder assembly which compensates for the unclamping effect of centrifugal force.
6. The relevant technical features not disclosed by D1 of claims 1+3, 1+7, 1+9, 1+10, 1+11+12, 1+11+14+15, 1+16+18 (or 1+11+17+18), 1+19+20, 1+(21-27), 29, 53 or 78, 79, 80, 81 or 82 refer to a coating between the moving parts (e.g. collet and shaft) inside the rotary tool holder. Thus these are the PSTFs of the second group (invention II) of claims and solve the problem of reducing friction between moving surfaces within the rotary tool holder.
7. The PSTFs of the two groups of claims are neither similar nor corresponding. Further, they represent the solutions to different problems. In conclusion, the groups of claims are not linked by common or corresponding special technical features and define 2 different inventions not linked by a single general inventive concept.

The application therefore does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Reference is made to the following documents:

D1: JP 2000 071115

D2: US5078558

D3: GB2002660

D4: GB1216694

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claim 1 is not new in the sense of Article 33(2) PCT.

2.2 The document D1 discloses (the references in parentheses applying to this document):

A rotary tool holder assembly (2-7) for high speed rotation comprising a collet (2) and a shaft (3'), the collet being moveable relative to the shaft between a tool gripping position, in which the inserted tool (1) can be gripped for rotation, and a tool release position (by release of nut 4), the shaft comprising a bore (3a) for receiving the collet (2), the shaft and collet shaped such that when the rotary tool holder assembly is rotated at a high speed the inner surface of the shaft bore (3a) substantially fits the outer surface of the collet (refer to figures 1 and 2).

The subject matter of claim 1 is therefore known from D1.

It should also be noted that a free, computer generated translation into English is available from the Japanese Patent Office via the Internet at the web address:
<http://www4.ipdl.jpo.go.jp/Tokujitu/PAJdetail.ipdl?N0000=60&N0120=01&N2001=2&N3001=2000-071115>.

2.3 The document D2 discloses (the references in parentheses applying to this document):

A rotary tool holder assembly (see column 5, line 61 to column 6, line 31 and figures 5 and 5E) for high speed rotation (column 7, lines 17-22, fig 6) comprising a collet (24") and a shaft (101"), the collet being moveable (column 5, lines 43-60) relative to the shaft between a tool gripping position, in which the inserted tool (25) can be gripped for rotation, and a tool release position, the shaft comprising a bore (27a) for receiving the collet (24").

357 The feature of claim 1 "the shaft and collet shaped such that when the rotary tool holder assembly is rotated at a high speed the inner surface of the shaft bore substantially fits the inner surface of the collet" is standard in the art and therefore disclosed by D1. This is especially true since the term "high speed" has no recognised definition in the art and is therefore to be regarded as a relative term.

The subject matter of claim 1 is therefore also known from D2.

- 3.1 Dependent claims 2,4-6,8,11,13,14,16,17,19 and 28 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:
- 3.2 The additional features of claim 2 are also known from Document D1. Refer especially to figures 1 and 2, which show the shaft (3) in the stationary and rotating situations respectively, and figures 3 and 4, which show the same situations for a "prior art" tool holding assembly. It can be seen that the difference in fit present in figure 4 has been eliminated in figure 2, as the shaft (3) deforms due to centrifugal force. The additional features of claims 4, 8 and 28 are also known from this document.
- 3.3 The additional features of claims 4, 8, 11, 13, 16, 17, 19 and 28 are disclosed in D2 and therefore the subject matter of these claims also lacks novelty.
- 3.4 The additional features of claim 14 constitute a minor modification of the rotary tool holder assembly of claim 11 which would be obvious for the person skilled in the art. The subject matter of claim 14 therefore does not involve an inventive step.

- 3.5 The additional feature of claim 5 (ie that when stationary the taper angle of the collet is greater than the taper angle of the shaft) is standard in the art of collet chuck design. This is clearly disclosed in document D3, page 1, lines 71-79 and document D4, page 2, lines 71-81. Since this difference in angles is a standard feature, its inclusion in the collet chuck assemblies of either D1 or D2 is a matter of standard procedure and therefore the additional features of claim 5 cannot be considered as inventive. Document D1 further discloses that the usual difference in angles is between 10 and 30 minutes of arc, with document D2 teaching a difference of 15 minutes of arc. The range 1-10 minutes of arc per claim 6 cannot therefore be considered to involve an inventive step.
- 4.1 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would appear to be appropriate, with those features known in combination from the prior art (eg document D1 or D2) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 4.2 Further, the features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).